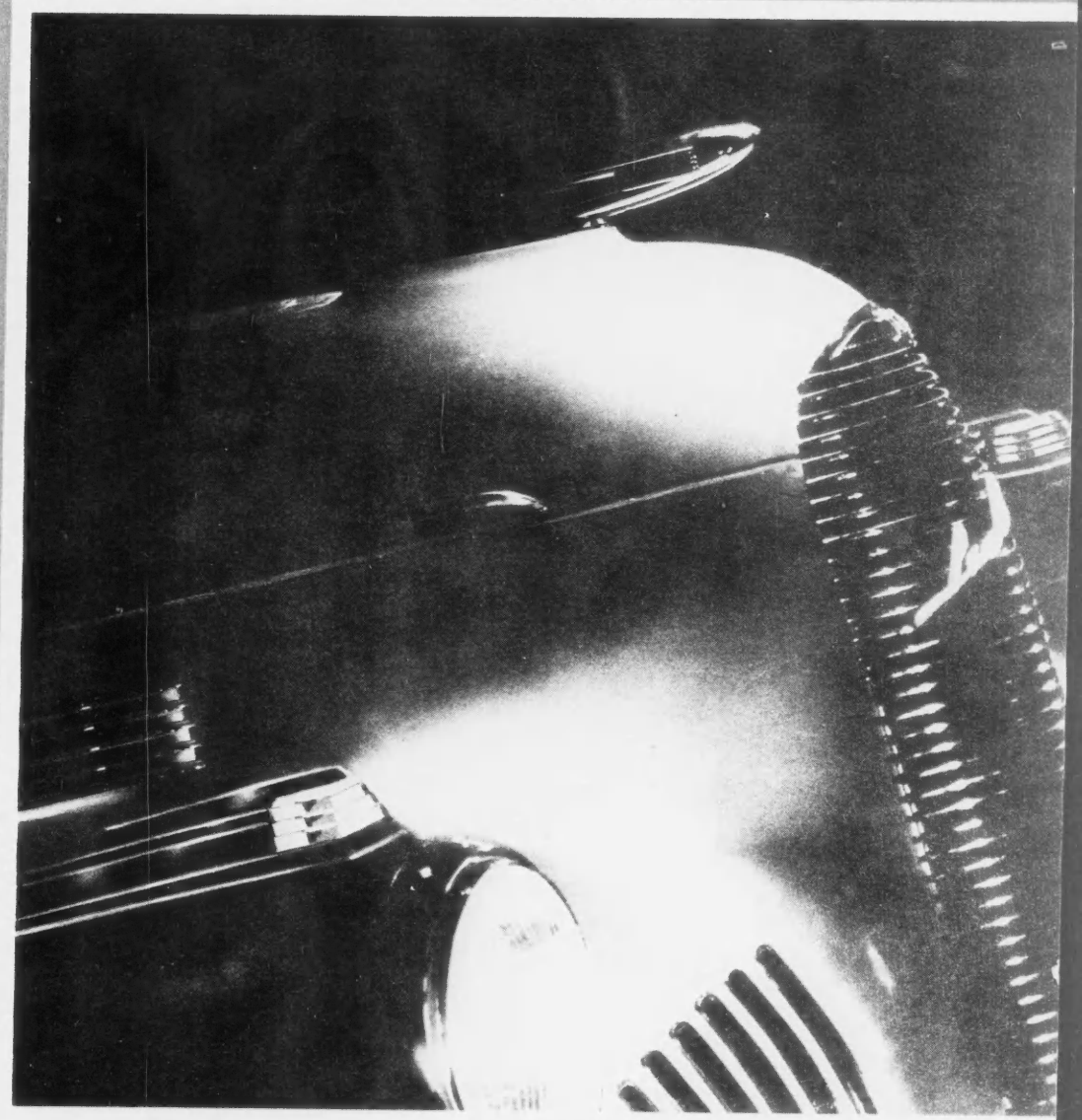
Bureau of Standards
NOV 18 1939

TECH ENGINEERING NEWS



NOVEMBER · 1939

Vol 20 no 6

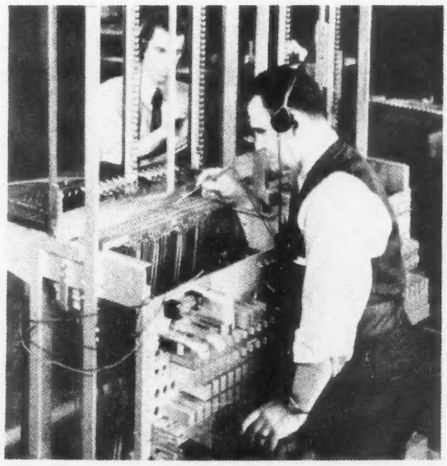
Count on your telephone *in a pinch*

A smell of smoke, a burst of flame—and instinctively you rush to your telephone for help.

Bell Telephone service is reliable for two reasons. The people who provide it are capable. The equipment is well made—Western Electric's part.

At your command is a vast plant—underground. overhead and in central offices—which responds so smoothly that you take it for granted.

It does so because into the production of the 43,000 different items entering into this plant have gone careful thought and skilled workmanship. That's been Western Electric practice throughout 57 years of telephone making.



Count on a Bell Telephone switchboard too, and all the rest of the complex apparatus. Here is shown one of hundreds of inspections which Western Electric makes.

Western Electric *. . . made your* **BELL TELEPHONE**

Packard

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Grace and beauty — yet hardly the work of a "dreamy, impractical artist"

Ford Motor Company

AUTOMOBILE DESIGN

ART PLUS ENGINEERING

By EDSEL FORD

OF all the elements involved in the development and production of the motor car none is perhaps more interesting or less understood than the appearance and functional design of the car itself. The work of creating a new automobile demands the closest co-operation between artists and engineers. This work is begun by the artists, who make scores of car drawings at least eighteen months before the car is put in production. When a design is selected, several tenth-size clay models are worked out, for the study of lines and surfaces. Then a full-size body layout is drawn on a blackboard to study details. Next a wood slat frame is constructed to serve as a skeleton for a full-size clay model. This wood frame supports the clay when the full-size clay model is made. A bridge or movable frame facilitates the taking of dimensions for the final drawings. The full-size clay model, when finished, painted, and equipped with all details, is studied by style and engineering experts for final approval.

Many changes are made, of course, throughout all these stages. The full-size clay model is worked on as a sculptor would work on a masterpiece. A little is added, a little shaved off, beads and moldings are moved up and down, door and window openings are moved repeatedly. This process alone may continue for four months or more. The car should be in production six or seven months after master models for profiling the dies are turned over to the die makers.

The designers say that the complete car must "feel" right. By that they mean the way it looks, the way it performs, the comfort of its appointments, and the general harmony of each of its elements in relation to all the others. To this end we make a skeleton seating model, to make sure seats are comfortable.

In designing our cars, we stress a distinctive "expression" — as exemplified in the Lincoln-Zephyr — because the front of the car might be called its face; and the first impression we get of a car, as of a person, is the face. So the objective is to make the car thoroughly pleasant — in its expression, its arrangements, its fittings, and appointments. The success with which all these are blended determines the "feel" of the complete car.

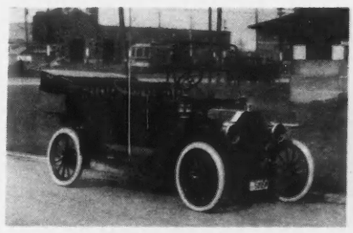
While all of the cars we build, the Ford, the Mercury, and the Lincoln-Zephyr, obviously have their own definite characteristics, there is a strong family resemblance between them marked by features originally introduced in the Lincoln-Zephyr, which is widely recognized for its style leadership.

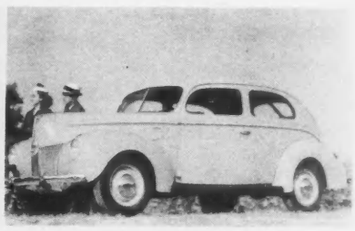
The aerodynamic results obtained in wind tunnel tests also have an important effect on our design. Streamlining, of course, is for eye appeal as well as for functional reasons.

As embodied in modern cars, streamlining has proven effective in reducing wind resistance at speeds permissible on the highways of today, thus giving increased economy. It has also made these cars quieter on the road by lessening wind noise. The elimination of sharp corners and angles is most necessary.

Even if it were possible to have perfect streamlining, the engineer could not use it, for a very good engineering reason. Perfect streamlining would pass the air over and around the car, but air is needed in the front of the car to cool the engine. In the Lincoln-Zephyr, advanced as it is in streamlining, care had to be taken not to go too far and sacrifice cooling efficiency.

That brings up another example of the coöperation between the artist and the engineer. Some may think of the low grille originated by the Lincoln-Zephyr as a mere trick of style. But it came through the effort to develop better cooling systems. Here air is taken in at the high-pressure area. And in the Lincoln-Zephyr — and the Mercury and Ford V-8, which also have the low type of grille — full advantage of this rush of air is taken by functional design inside. The radiators of these cars are low and wide, in order to place them directly behind the low grille, and the fan is down on the end of the crankshaft instead of up on the generator shaft.





1914 · All in our time · 1940

The low grille also provides better accessibility to the engine — one can drain the radiator more easily, get at the ignition system more easily, and there is more room on either side of the engine.

The old notion which depicted artists as dreamy impractical men, is obsolete. The artist in industry works in a practical partnership with the engineer. The engineer uses the artist's talent to give his idea beauty and grace; the artist uses the engineer's skill to give his ideas practical substance; each stimulates and aids the other. Out of this partnership has emerged the modern car.

Design extends to the interior as well

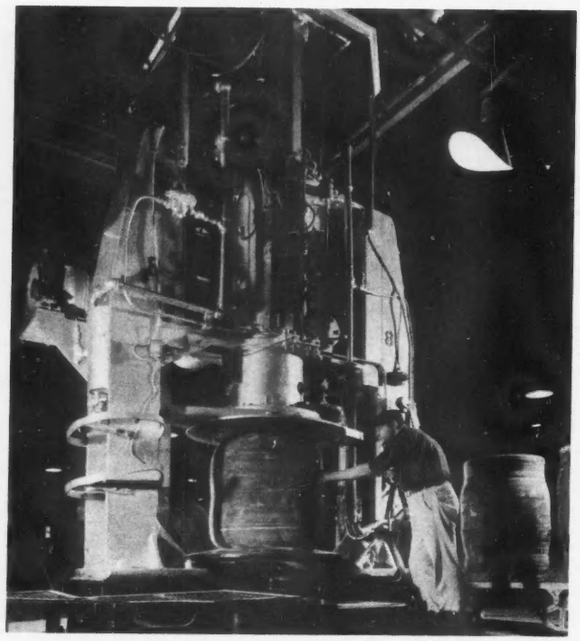
RIDE 'EM ROUGH!

FOR WHEELBARROW OR ANTARCTIC SNOW CRUISER—IF YOU NEED TIRES, THE INDUSTRY HAS THEM

By P. W. LITCHFIELD
PRESIDENT, THE GOODYEAR TIRE AND RUBBER COMPANY

IN this era of constant change and expansion in the field of automotive transport, the problems confronting the manufacturer who produces tires for the automobiles, trucks, tractors, and special purpose vehicles of today are many and varied. Steady improvement in motor vehicles themselves, better highways over which automobiles and trucks operate, and introduction of new units designed for use in heavy off-the-road service; all present a challenge to the ingenuity and resourcefulness of the tire manufacturer.

To meet these changing needs as they arise, the manufacturer must keep ahead of the procession and must



Courtesy Firestone

Here rests a large truck tire on the shaping machine. The pressing will take place with an inflated air bag inside the tire

be able to provide tires that handle more than adequately the new demands made of them. In the early days of the automobile, tires that were able to travel even a few thousand miles were exceptional; the cars themselves were used only during the summer months. As the automobile grew more popular, car manufacturers improved design, installed better and more powerful engines, steadily lessened the probability of motor trouble on the road.

Tire manufacturers too, found out more about their product and were able to increase the mileage normally expected of a new set of casings. Improvements came, slowly at first, then faster and faster, until today constant betterment of product is routine.

Best illustration of the steady improvement in tire construction, with consequent benefit to the consumer, is seen in a comparison of the best quality tire for light cars in 1926 with the best quality tire for the light cars of today. In 1926, a tire and tube cost $23.95, as compared with today's price of $19.35, a saving of $4.60. In addition, today's tire uses over six pounds more material than the 1926 tire, and gives an average of more than twelve thousand miles of additional service. The effect of this saving to the car owners of the nation is tremendous, beside being indicative of the tire industry's contribution to public well-being.

Some indication of the problems faced by the tire manufacturer may be seen in the truck tire field. Trucks range in size from small one-half ton vehicles used in local delivery service to the huge tractor-trailer units that transport heavy loads across long stretches of country. The delivery truck, making hundreds of starts and stops every day, needs a different type of tire than the huge tractor-trailer that makes long runs without stopping. The farmer, the rural mail carrier, others who must traverse the mud and snow of back roads in winter, need tires built primarily for traction. The dump truck, backing into muddy fills, over sharp rocks, needs still another type. All these vehicles constituted separate problems for the tire manufacturer, and all have been met with tires that may resemble each other somewhat in outward appearance, but which have been designed and built for a special type of service.

The industrial truck that hauls materials in factories needs a special kind of tire. The airplane needs a tire that will sustain the heavy shocks of landing, but which need not necessarily give long mileage. Even the wheelbarrow presents a tire problem.

New developments in design and construction are constantly being put into effect. One of the most interesting in recent years has been the use of rayon in tire carcasses, and was the direct result of efforts of tire engineers to combat the effect of heat. Tire engineers have known for years that heat is the greatest destroyer of tires in general, and truck tires in particular. Temperatures ranging from 250 to 290 degrees are common in truck tires, and in some cases where operations are severe, temperature will exceed 310 degrees.

The ability of rayon to retain a major part of its cold tensile when very hot suggested its use in tire carcasses, and even with the commercial type rayon available when experiments were started, results indicated

that a major forward step in tire manufacture was at hand. As experiments and tests proceeded, special rayon cords better fitted for use in tires were developed, and we now find truck operators the nation over obtaining mileage unheard of with previous types of construction.

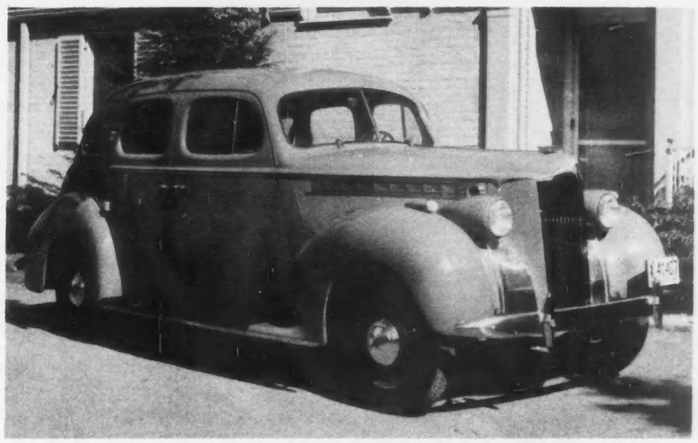
Between the time of the early experiments and the rayon-built tires of today, however, a number of problems had to be solved. These included obtaining adequate strength in the rayon, controlling the strength, controlling moisture resistance, and obtaining proper adhesion to rubber. All these problems were carefully studied and conquered, and thereby made available to the nation's truckers a tire that has less rolling resistance, thus freeing more power to push the pay load along and using less gasoline; a tire that is cooler running, thus combating the old enemy, heat; a tire that has greater durability; and a tire that has greater resistance to bruises. All of these advantages mean a lower tire-cost-per-mile to the truck operator, and the rayon-built tire is now not only carrying heavy loads over long distances at high speeds, but is producing long, trouble-free service on passenger cars as well.

Assuring greater safety for the motorist is always a challenge to the tire manufacturer and as a result of ceaseless effort over a period of years, during which hundreds of different designs were made, tested, and discarded, there was made available a safety device that eliminates the danger of accident following a blowout. When an ordinary tube blows out, all the air escapes instantly, dropping the wheel a number of inches and making the car exceedingly difficult to control.

The new safety device consists of a two-ply inner reserve tire within a conventional-appearing tube. Air chambers of the reserve tire and the outer tube are connected by a single tiny vent, and should a blowout occur, air can escape instantly only from the outer tube. This allows the car to ride on the inner reserve tire, from which the air can escape only through the tiny vent. Thus, the driver is allowed ample time to make a safe stop, with his car under complete control. The blowout has, in effect, been converted into a slow leak, and it is impossible to estimate the number of serious accidents, with attendant loss of life, that have been avoided in this manner.

The farms of America are presenting new problems to the tire engineer. The present decade witnessed the beginning of a trend that is revolutionizing agricultural processes: equipment of farm tractors and implements with pneumatic tires. The first pneumatic tractor tires were put in service in the Florida citrus groves, when steel wheels with lugs had stalled in the sandy soil, and had cut the roots lying close to the surface. Large pneumatics not only eliminated the stalling and root cutting, but demonstrated their ability to get the job done in less time with lower consumption of fuel. Further tests showed that in addition to savings of fuel and time, operator comfort is increased. The cushioning of the pneumatics keeps vibration and breakage to a minimum. Mounted on rubber, the farm tractor's scope was broadened. It could go places and do jobs formerly impossible with steel wheels. Tread designs have been developed that give traction equalling or bettering — in most instances — that provided by steel wheels with lugs. Farmers, quick to see the advantage of rubber-tired tractors, bought them in increasing numbers, and it is reasonable to assume that manufacture of farm tires may soon rank in importance with production of passenger car and truck tires for replace-

(Continued on page 124)



Photographs courtesy Goodyear and Packard

SAFE DRIVING

THE GOAL OF TRAFFIC POLICE

By EUGENE McSWEENEY

MASSACHUSETTS COMMISSIONER OF PUBLIC SAFETY

THE 1940 automobile is being currently introduced to the motorists of America. It is a streamlined vehicle built for speed, comfort, and safety. Automotive engineers have stressed the factor of safety in planning this newest vehicle.

The progress of the engineer has been amazingly swift. In a few years he has designed a machine which is a far cry from the original undependable automobile of the beginning of the century. This new vehicle, in itself, will not be a problem to the police. There are drivers, however, who will operate this 1940 model with the same lack of skill as the driver who operated the first Juggernaut, which frightened children, caused horses to run away, and made adults take to cover.

Statistical records of accidents and violations clearly indicate that most motorists have progressed with the mechanical improvements of the automobile. They are aware that the laws must not be violated and that it is necessary for every motorist to drive with due consideration of his own safety and that of all motorists and pedestrians.

For those whose aptitude did not develop along with the general progress of engineering and safety, it has been necessary to devise certain laws for the operation of motor vehicles. These laws are primarily designed to prevent accidents and to insure the lives and property of the public.

This minority of motor vehicle operators is not segregated in one community, municipality, or state. Accidents and violations happen in locations where their occurrence seems impossible. To prevent these accidents, it would be necessary to have a policeman at every corner and along every highway. The personnel that would be required for such a program is too enormous to even contemplate. The best system of curbing violators and preventing accidents is to concentrate the available personnel at the locations of the accidents and violations. There are certain localities which have been charted as dangerous, and the police focus their attention on those areas. This system is called *selective enforcement.*

Selective enforcement is the basis of the safety program of the Massachusetts State Police. Each of the twenty-five barracks record and chart the motor vehicle accidents which occur within its jurisdiction. The dangerous spots, the hazardous curves, the obstructions, and the physical defects in the highway system are charted. These records are a visible index of the areas where enforcement is necessary. Assignments of patrols are made for the policing of those areas.

Prior to 1936 violations were brought to the attention of the various courts for adjudication. This system was ponderous and slow-moving, and it required the presence of the arresting officer as well as the violator. Such practice eventually resulted in the curtailing of the number of officers available for enforcement, causing the arresting officer as much inconvenience as the offender. (*Continued on page 125*)

TECHNOLOGICAL LAGGARDS

VARIED ARE THE REASONS WHY THE PUBLIC, IN MOTORING AS IN OTHER FIELDS, FAILS TO KEEP PACE WITH SCIENCE

By THOMAS P. HENRY
PRESIDENT, AMERICAN AUTOMOBILE ASSOCIATION

ACROSS the blinding glare of the Bonneville salt flats a mechanical turtle streaked at 368.85 miles an hour, and a London fur broker set a new land speed record. And each year on the burning bricks at Indianapolis, the strength of men and metals is tested in a 500-mile grind of skill, endurance, and daring.

These are two of the ways in which advances in automotive engineering prove their worth by actual performance. In sanctioning, governing, and timing these events, the A. A. A.'s Contest Board has seen old records topple again and again, and new ones set as man pushes ever forward in his assaults on time and space.

One of the things that has impressed me ever since I became connected with the motoring movement many years ago, is the slowness with which technological advance can be translated into terms of human benefit. Each time the technician pushes on to new frontiers, generally much time must elapse before the new problems created can be solved, before the public accepts the innovation, and, in may cases, before the laws of the land can be changed to permit use of the new device.

In perhaps no other branch of endeavor is this more true than in the field of the automobile. Today the automobile is more than a means of individual transportation, it is practically a necessity for almost every family in the land. But its history is rich in heartbreak, frustration, and ridicule for those who have taken part in making this fact possible. In England, self-propelled road carriages were literally legislated out of existence for many years. In America, automotive development advanced in the face of the most abominable roads imaginable, organized resistance on the part of horse owners and breeders, the buggy and carriage industry, and general apathy on the part of the public which regarded the automobile as an untrustworthy, dangerous, rich man's toy. A mayor of Cincinnati declared women were physically incapable of driving a car, a financier ridiculed the prediction that annual car production would reach five hundred thousand, and a newspaper editor refused to ride in a car on the ground that it was incompatible with his dignity.

The early objections and obstructions to use of the automobile back in the old days have long since disappeared and seem only quaint and humorous to us now. But a generation or so from now, it is almost inevitable that the factors retarding full use and enjoyment of the automobile today will seem equally as quaint and humorous.

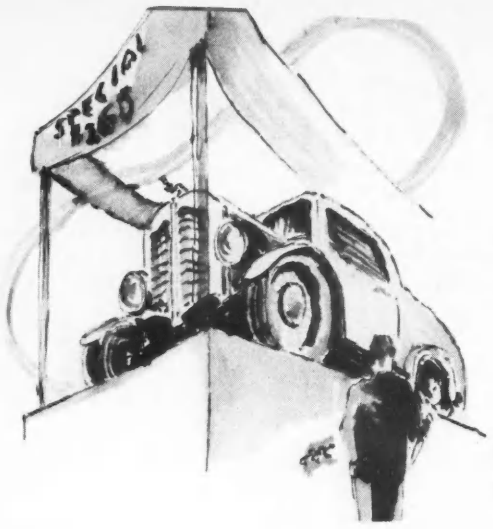
"Back in grand-dad's time," we can imagine one of our descendants snickering, "they had cars that could do up to a hundred miles an hour with ease, but most of the roads were built for only forty or fifty miles an hour. And most of the time the cars were so jammed together — particularly in cities — that they could only go five or ten miles an hour and often had to stand stock still for long periods. And when they got where they were going —" (pause to wipe away tears of laughter) "they couldn't stop because there wasn't any place to park the car. Traffic lanes crossed each other on the same level so that cars ran slam-bang into each other, and pedestrians walked back and forth in front of the cars . . . and they wondered why so many people got killed!"

But what may seem amusing to our grandchildren is a very serious matter with us today. The problem of building our highways up to meet present traffic needs, of limiting access to these roads, of dividing the lanes and separating intersections, of renovating our horse-and-buggy cities to fit the modern vehicle, of providing adequate terminal facilities for cars, of revising antiquated laws (some still require automobiles to come to a full stop if a horse shows signs of fright), and, in general, of stepping the whole traffic picture up to the possibilities envisioned by the engineers is a most difficult one. To the stupendous economic difficulties presented, there is the added obstacle of public apathy and failure to recognize the tremendous advantages offered by full realization of the benefits made possible by engineering advance.

Back in the early days of motoring, automotive problems were serious, but comparatively simple in nature. By proving conclusively that their vehicle was superior in all respects to the horse and buggy, and by enlisting in the good roads movement and joining in the cry, "Bring the country out of the mud," motorists were able to overcome these early obstacles. Today, the problems are just as serious and are infinitely more complex, and the lines of battle less clearly drawn. But with full coöperation of everyone interested in automotive progress, these problems eventually will be solved.

The report on Technological Trends and National Policy, issued in 1937 by the National Resources Com-

(*Continued on page 134*)



"CAVEAT EMPTOR"

LET THE BUYER BEWARE

By JEROME COE, '42

CONDENSED FROM "FACTS YOU SHOULD KNOW ABOUT BUYING USED CARS" (BOSTON BETTER BUSINESS BUREAU)

MOST people are unable to judge the condition of a used car and must depend entirely upon the reliability of the dealer. The dealer's reputation and honesty are generally their best protection. Remember, the reliability of the dealer is the most important factor in the purchase of a good used car.

Some judgment of a dealer may be formed by examination of his advertising, and a comparison of it with the facts. A dealer who exaggerates or mis-states in his advertising is likely to exaggerate and mislead in his selling. Such statements as "we have the greatest selection of used cars in the city"; "the greatest values"; "best deal in the city"; and "wholesale prices" are warning signals for the cautious buyer.

Dealers operating falsely under finance company names and creating the impression of offering "repossessed" cars at bargain prices, should be avoided. The fact that a car is "repossessed" does not make it better or cheaper than any other used car. When such cars are sold direct to the public, they are generally sold at competitive market prices.

Unethical dealers use "bait" advertising, advertising a car at less than prevailing prices for the purpose of attracting customers, but with the intention of selling another car instead. Sometimes the car advertised at "bargain prices" has "just been sold," or the salesman may use other methods to divert the customer's attention. If you respond to an attractive used car offer, and are then told the car is in terrible condition, and are offered something at a higher price — look elsewhere. Beware of the "bait" advertiser.

Trade-in allowances may vary on cars in different price ranges, not because the trade-in changes in value, but because a dealer may sacrifice a portion of his margin in order to sell certain cars. The dealer who displays prices in plain figures cannot make those prices too high or he will drive away trade. The dealer who marks his prices in code, or does not display any price, may do so for the purpose of bargaining, or offering a high trade-in allowance. This is made possible by an inflated selling price or by a high finance charge. "Bushing" a customer is an unethical practice wherein a salesman offers a high trade-in allowance, which is later repudiated by the management with the purpose of persuading the customer to turn in his car at a lower price. The first offer by the salesman detains the customer and prevents him from looking elsewhere.

Dependable dealers will not object to thorough examination of a used car, nor to a reasonable test drive. The dealer who discourages this should be avoided. However, few people, except experienced mechanics, can determine the true condition of a used car. In fact, a used car can easily be "doped" to hide its faults. Most used car purchasers must, therefore, depend upon the integrity of the dealer.

Mechanically minded buyers might check on some of the more technical points themselves. Too much play in the steering wheel may mean loose steering connections. Push and pull the front wheels sideways and watch the kingpins for looseness and wear. Observe whether the brakes have been tightened to the limit, and what the condition of the linings is. Is the frame bent or twisted? A car badly out of line may be detected by having some one watch it in operation on a straight road to see whether the rear wheels follow the front wheels in a straight line. Check the transmission and rear-end grease for "dope." Check gasoline for the presence of ether. Jack up a rear wheel, and with the transmission set in high gear rock the wheel to determine the amount of play. If it exceeds three inches on the edge of the wheel, it means excessive wear in the differential or universal joints. Then put the motor in low and reverse gear and test the transmission in the same way for excessive looseness.

Most legitimate used car guarantees are written assurances that the car has been reconditioned or that the dealer will defray all, or part of the cost of repairs necessary under the proper use of the car for a certain period of time. Beware of unreasonable verbal or written guarantees on used cars. The unqualified word "guaranteed" means little. A guarantee is only as good as the one who gives it. It should be in writing and specific as to meaning. Regard as worthless those claims, promises, or guarantees which the dealer refuses to give in writing.

Remember: 1. Perfection cannot be expected in a used car. Even new cars are protected by guarantees against possible defects in material or workmanship. 2. If a car is described as "reconditioned," the dependable dealer will co-operate by showing or proving in what way it has been reconditioned. 3. In those states where inspection of motor vehicles is required before licensing, the dealer should guarantee in writing that the car will pass such inspection. Or, the dealer should provide the necessary inspection certificate himself. 4. It is primarily important to do business with a reliable dealer. Make inquiry among friends as to where they bought their cars. Form your opinion of the dealer's advertising and methods from your own experience and along the lines suggested herein. In some places local licensing authorities of used car dealers can advise whether complaints have been filed. Better Business Bureaus may have information regarding dealers in their cities.

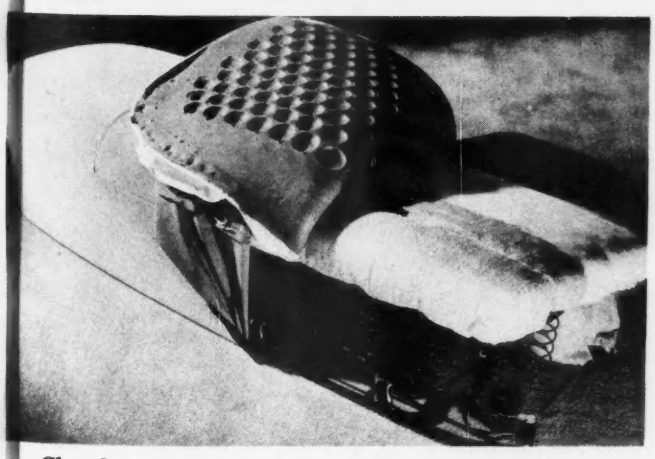
1940 ON WHEELS

By HARVEY FREEMAN, '43

Chrysler

Chevrolet

Buick



Chrysler

LESS emphasis on power and speed; more on style, comfort, convenience, and safety appears to have been the fundamental keynote struck by designers and manufacturers in producing the 1940 cars.

Outstanding among mechanical developments are improved transmissions and clutches, provision of built-in directional indicators on more models, and superior lighting and heating. Comfort is further promoted by refinements in suspension systems, wider use of "foam rubber" in seat cushions, better balancing and superior mounting of engines, roomier bodies, and better ventilation and vision.

Improvements in transmission are responsible for greater gains in economy than are engine changes. Overdrives are more popular and are available in most makes of automobiles. Their benefit is realized in fairly fast driving, but they also help to reduce engine wear and noise, and are arranged for instant disengagement when conditions call for rapid acceleration. More transmissions are being placed on their sides to facilitate the lowering of floors and reducing or eliminating tunnels. The change also makes shifting easier.

Independent suspensions have shown a further gain this year but have not yet completely displaced other types. This designing objective to provide an easier and more comfortable ride accounts in part for other changes toward longer wheelbases.

Practically every car on the market will have, as standard equipment, the new Sealed Beam Headlight, the result of a coöperative engineering achievement which called for a pooling of the knowledge of automobile manufacturers, safety authorities, and makers of headlight equipment. The new headlight has the filament, bulb, reflector, and lens in one sealed unit. In case of a "burn-out" a whole new unit is replaced, at a cost of about $1.35.

Another important addition to some cars will be "Safety Plate" Glass for use in windows, ventpanes, and windshields, eliminating the distortion waves produced by ordinary window "safety" glass. Exhaustive tests show that its clarity reduces eyestrain 62 per cent, minimizing driving fatigue.

CHEVROLET

Chevrolet is bidding for 1940's top position with a strikingly new car, after being first in total new-car registrations in eight of the last nine years. The 1940 models have been presented in three series: the Special De Luxe, the Master De Luxe, and the Master 85, each being fundamentally similar, differing in trim and appointments only.

The new and exclusive vacuum-power shift, in which the vacuum supplies 80 per cent of the required force, is offered as standard equipment on all passenger car models. Helical gears are used throughout the transmission to provide silence in the drive. New full-vision bodies by Fisher are larger and closer to the ground. Window and windshield area have been successively increased. Because of the increased electrical load, generator output has been increased 20 per cent. Other mechanical advances made by Chevrolet this year include: improved tappet and valve design and a new high-capacity oil pump. Power is now transmitted to a hypoid-gear rear axle by means of a torque tube to relieve the rear springs of undue loads.

PONTIAC

Seeking the widest market coverage in the history of this organization, Pontiac presents seventeen models for this year.

(*Continued on page 127*)

HYDRA-MATIC DRIVE

AS PRESNETED IN THE OLDSMOBILE FOR 1940

By A. CARLETON JEALOUS '42

ELIMINATING the entire clutch assembly, including the clutch pedal, Oldsmobile leads the automobile field for 1940 with its "Hydra-Matic Drive." To the public this means smoother, simplified driving; to the engineer, practical development of a principle known for fifty years.

Basically, "Hydra-Matic Drive" consists of a liquid flywheel coupled to a fully automatic transmission, enabling the car to shift itself back and forth through four speeds. With no chance to chatter the clutch or jump the car forward, the driver merely steps on the starter, shifts the lever on the steering column from neutral to high, and steps on the accelerator. The car glides forward, automatically shifting from first to third and, at 23 m.p.h., to fourth speed. Where conditions dictate, the car may be kept in low speed by moving the lever back to "Lo."

The "pick-up" gear for rapid acceleration, needed in passing other cars, is also available. When the driver depresses the clutch to the floor, the gears automatically shift from fourth back to third speed, and the car darts forward past the slower vehicle.

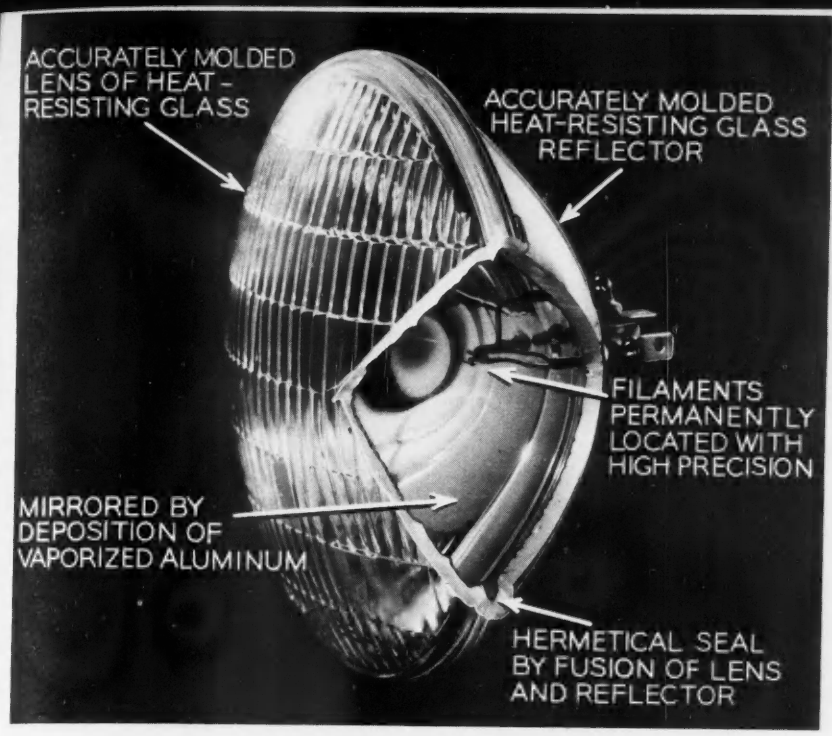
The new drive enables the driver to bring the car to a stop on a steep hill and hold it there, *not* by the brake, but by a small force of the engine exerted through the liquid coupling. The car does not stall because it is constantly in gear.

The liquid coupling consists essentially of two rotors exactly identical in size and shape, but different in purpose. The concave surfaces are divided by vanes. The rotors are mounted facing each other with only a thirty-second of an inch clearance. One is attached to the engine crankshaft; the other, to the automatic transmission. The whole is enclosed in a steel housing filled with oil.

Centrifugal force throws the oil from the vanes of the revolving crankshaft-rotor against the transmission-rotor, causing the latter to rotate in turn. At idling speed the force thus transmitted is not enough to move the car, but acceleration results in a smoother start than is possible by the best driver using a mechanical clutch. Furthermore, the liquid coupling is incapable of wear, no matter how the car is driven.

Olds has built an entirely new plant to house the manufacture of the "Hydra-Matic Drive."

MOVE GEAR SHIFT LEVER 3 TIMES
PRESS ACCELERATOR 3 TIMES
RELEASE ACCELERATOR 3 TIMES
DEPRESS CLUTCH 3 TIMES
ENGAGE CLUTCH 3 TIMES


ACCURATELY MOLDED LENS OF HEAT-RESISTING GLASS
ACCURATELY MOLDED HEAT-RESISTING GLASS REFLECTOR
FILAMENTS PERMANENTLY LOCATED WITH HIGH PRECISION
MIRRORED BY DEPOSITION OF VAPORIZED ALUMINUM
HERMETICAL SEAL BY FUSION OF LENS AND REFLECTOR

SEALED BEAMS

By DONALD SCARFF '41

THE best in design, engineering, and production methods have again been combined to enable the 1940 automobiles to surpass all previous models in comfort, economy, ease of driving, and safety. The human element is still the unknown quantity in driving. As a result the highways are comparatively unsafe, especially at night. To correct this, a safety feature, found on 95 per cent of all the new cars, will soon take its place among the accepted contributions to safety such as four-wheel brakes, safety glass, or all-steel bodies. This development is the Sealed Beam Headlight.

Statistics show us that, though highways at night carry only one-third of the normal day load, two-thirds of the fatal accidents occur during this period. Several reasons are suggested to account for this, practically all finally pointing to insufficient lighting and improper use of headlights.

Recognition of this fundamental lack in the modern automobile led to the development of the present Sealed Beam Headlight. Research was organized three years ago in the formation of a committee by the automobile industry which worked in coöperation with the lamp and bulb manufacturers, safety organizations, and the American Association of Automobile Administrators. With the aim of safer and easier night driving, this committee has developed the present lamp, made legal its use in forty-eight states, and has, as a result, seen its inclusion as standard equipment on all but four makes of the 1940 automobile.

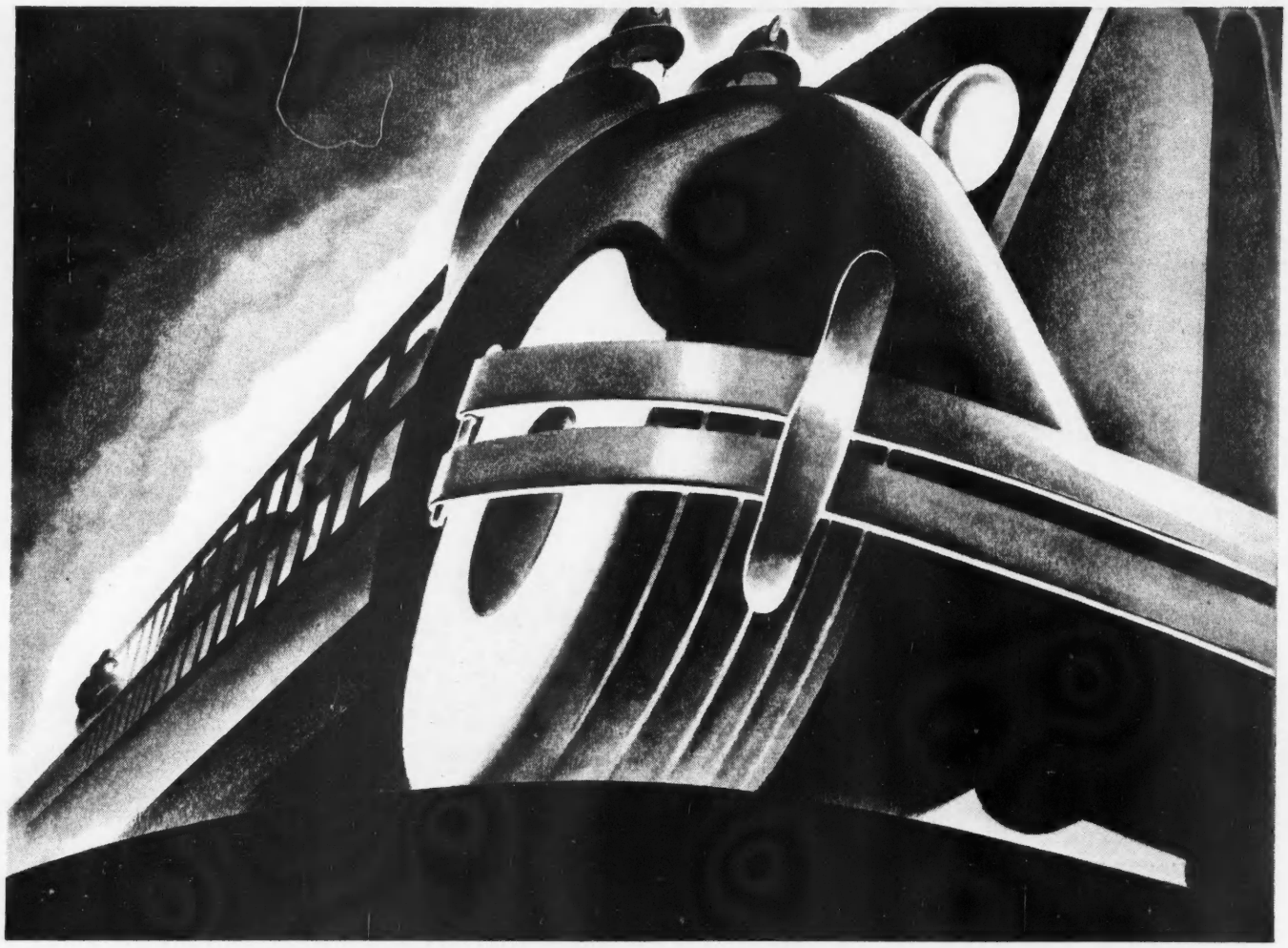
The Sealed Beam Headlight is an integral unit, the lens, reflector, and lighting source being incorporated into a permanently assembled and sealed lamp. Thus the reflector never loses its efficiency through the life of the bulb, and, by merely replacing a worn-out bulb, "new car" lighting is obtained. It is also worth while to point out that by uniform factory assemblage the headlight is properly and permanently focused.

This is not the only major change, however. Test indicated that the standard thirty-two candlepower bulb provided insufficient lighting. As a result, the new unit gives forty to forty-five watts at a maximum, an increase of 50 per cent in available driving light. This added power is not only an aid to distance "seeing," but gives far more even distribution of light together with better coverage of road shoulders. Twin filament construction gives two types of driving beams, a country beam and a traffic or city beam. The parking lights are controlled from the instrument panel together with the traffic beam, this changing to the country beam by means of a foot switch.

As can be seen, the new type of headlight will be an invaluable aid to night driving. Besides being an adequate source of maintained light, it is a controlled source that remains in permanent internal focus. The law enforcement agencies will be virtually relieved of their responsibility in connection with the maintenance of lighting efficiency, and with the substitution of improper bulbs, lenses, and reflectors.

An illustration of the visibility range that is permanent to the Sealed Beam Headlight

The Sealed Beam Headlight gives every indication of opening up new highways to the motorist. Not only will night driving be made easier and safer, but the resultant increase in night traffic will lighten the daytime load. The research laboratories have not finished their work with the new headlight, and we may expect further improvements to help make driving a pleasure and add hours of useful driving to the modern automobile.



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EDITORIALS

AS WE GROW

The opening of the doors of Building VII last fall represented a long-sought step on the part of the Institute — that of complete unification of the scholastic plant. The excellent facilities now available to students in Architecture could not be in a more appropriate place. Complete solidarity in the educational unit has been achieved.

When viewed in a similar light, the construction of the new swimming pool means more than a mere addition to the Institute's present athletic facilities. Last year swimming was one of the four athletic activities which held practice and met rivals at places other than at the Institute. The dedication of the pool next spring will bring this sport home to Tech, and provide it with a greater opportunity to grow in popularity with the students, a necessity to the spirit and success of any activity.

During former years, it has been an accepted fact that the inaccessibility of the University Club's pool has handicapped the swimming team. Though the pool has provided the necessary facilities in a very satisfactory manner, its location, relative to the Institute, has restricted the team to three practices a week. This restriction was, and is, a definite disadvantage.

Consideration of the Institute's policy to build the best insures a building and pool which will be superior in every way. There can be little doubt that the location of the new pool, as well as the qualities of the pool itself, will serve to create student interest, and thus increase participation in the sport. As a diversion, swimming will probably rival squash in popularity next year because of a carry-over of summer interest as well as because of the pool's attractive characteristics.

It is no doubt true that the three sports which will remain off the Institute grounds, golf, tennis, and hockey, will not lack the interest necessary to their success. However, the presence of ice-hockey and tennis as Institute sports on the grounds can be looked forward to as possibilities. As such, their presence would do much to enliven the spirit which accompanies these activities.

HOME-MADE RUBBER

One of the major domestic and industrial problems of the United States is the complete dependence on foreign countries for a supply of raw rubber. Because the rubber tree will not flourish in the Western Hemisphere, all our raw rubber must come from the vicinity of the East Indies. In time of war, the supply could be easily stopped. This would be fatal, because, with our rubber supply gone, the automobile tire industry would cease, and in a short period of time, virtually all military, commercial, and pleasure vehicles would be crippled. With this thought in mind, the nation's scientists have been experimenting on two possible solutions to the problem — synthetic rubber and a new rubber producing plant.

Such synthetic rubber compounds as Neoprene, Thiokol, Buna, and Soyprene are used in the power cable industries, and have even replaced rubber gaskets, rubber laboratory equipment, and many other items requiring a greater stability than rubber gives. From a commercial standpoint, however, no synthetic rubber has been found to replace the natural product in automobile tires.

A rubber producing shrub known as Guayule has been found growing in central Mexico. This plant requires seven years to reach the producing stage, but even when growing in an uncultivated state, it will yield a fair amount of crude rubber. In fact, over six million pounds of raw rubber from the uncultivated Guayule were imported from Mexico last year. Upon cultivating the plant in California, the experimenters found that Guayule would produce rubber in four years and that the cultivated shrub yielded about one-third more rubber than when growing in a wild state. This experimental plantation, which was run on a small scale, yielded about eight hundred thousand pounds of raw rubber.

Since our rubber consumption is six hundred thousand tons a year, there is a gigantic gap to fill. Synthetic rubbers can never fill this gap, for they are much too expensive. Guayule rubber, besides being practically unknown, is at present on a non-profit financial basis. However, if further cultivation projects prove to be successful, the United States need no longer be completely dependent upon distant countries for its raw rubber supply.

Showing natural rubber being stored in heating and thawing rooms previous to processing operations
Each bale weighs about 250 pounds

Firestone

RIDE 'EM ROUGH

(*Continued from page 115*)

ment purposes. With pneumatic tractor tires so successful, the next step was similar equipment for farm implements, and more and more of them are now being sold equipped with rubber tires.

Each special purpose vehicle presents its own tire problem. Earth movers, graders and similar units have resulted in development of huge tires capable of withstanding almost unbelievable punishment on the rough terrain over which they must operate. Huge trucks are coming into increasing use in strip mining operations, and tires must be built to give good service over sharp rocks and in deep mud, far from the nearest highway. Some tires, designed to carry a load of twelve tons each, must actually carry twenty-two tons each in service.

Occasionally a very special problem comes along. Examples are the marsh buggies used by Gulf Oil Corporation in geophysical survey work in southern swamps, and the snow cruiser built by The Research Foundation of Armour Institute of Technology, for use in Antarctic exploration. Tires for these units are of the same size, and are the same in external appearance. The marsh buggy tires are used as flotation gear in traversing swamps; the tires on the snow cruiser will enable it to cover vast areas of the frigid Antarctic at a speed hitherto impossible in exploration of this type, and in temperatures as low as 80 degrees below zero.

The tire manufacturer must meet new problems every day, must solve them as they come up, and must make a product that bears the mark of constant improvement.

Firestone

A tire emerging from a steam-heated vulcanizing and shaping mold

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SAFE DRIVING

(Continued from page 116)

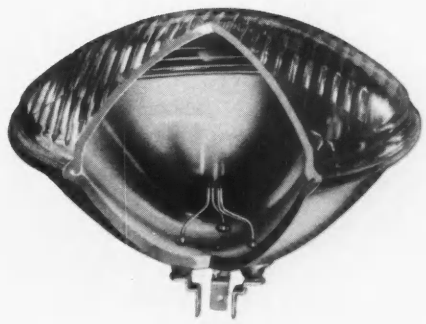
In 1936 a coöperative system was devised between the Massachusetts State Police and the Registrar of Motor Vehicles whereby all minor violations were sent to the Registrar for adjudication. The Registrar made his decisions from the records of the offenders. The personal element was almost entirely eliminated, and the case was decided wholly upon merit or demerit. First offenders received a written warning and this record was filed. Subsequent violations brought the forfeiture of the driver's license.

When this system was first adopted, it was attacked as a radical divergence which prevented the offender from having his day in court; but the death toll took a sharp drop, insurance liability rates were reduced, and the highways were made safer for sane drivers.

Another very important adjunct to the accident prevention system of the Massachusetts State Police is the work being done by the Traffic Division of the State Department of Public Works. Traffic Engineer Edgar F. Copell has an excellent system of recording all accidents on State highways, and these records are submitted to the State Police to complement the reports they have of accidents which are investigated by the troopers. The combined reports give the State Police a complete picture of the accident situation and their locations are recorded and charted.

The Traffic Division also receives reports from the State Police of highway defects which cause accidents. Wherever there is a series of three or more accidents, engineers of the Department of Public Works make a survey of the accident area to determine if the cause can be eliminated by changes in the construction of the highway.

A major safe driving step
The Sealed Beam Headlight, described on page 121



In Massachusetts there is a mandatory inspection of all motor vehicles twice each year. This inspection has done a great deal toward the amelioration of the equipment of the vehicles and has added a large measure of safety to motoring. However, during the entire year, the troopers are constantly checking lights, brakes, and other equipment of automobiles to make sure that the machines are properly equipped.

The enforcement of the motor vehicle laws by the State Police is carried on with the

maximum of courtesy and consideration, but each violator is treated with firmness. The officers are taught in the recruit training school, and later in the advanced training school, that motorists who commit violations are not committing a personal affront to the officer — the offense is against the safety code which has been established by the law-makers. This attitude helps to eliminate the belligerence which some policemen show in handling traffic cases and also makes it possible for the officer to assume a fair and impartial attitude toward the offender.

There are no so-called "traps" in the enforcement system of the State Police. In fact, the troopers are posted in dangerous locations where they are plainly visible to slow down the fast drivers. Posting officers at hazardous locations where they can be seen is one of the focal points of *selective enforcement.*

The third main phase of accident prevention lies in education. There are various means of reaching the public to teach them to drive carefully. Educational programs are designed to influence all drivers, but it is difficult to lecture to the bellicose driver who thinks every other motorist is a competitor whom he must challenge verbally, and with squawks of his horn, at every intersection. This type of driver usually claims that he is a victim of "police persecution" when he is apprehended.

Medical research and statistical analyses of the effects of alcohol upon the efficiency of an operator have been widely publicized; newspaper obituaries carry the results of trying to drive while intoxicated; the records of the criminal and civil courts tell the unhappy story of the aftermath of such experiments; and, although the consensus of opinion of the laymen and scientists is "it can't be done," some still try. The police also try by various methods to teach the motorists that a befuddled brain cannot control a motor vehicle.

The National Safety Council claims that 300 miles of continuous driving increases eye-strain 40 per cent and impairs coördination 47 per cent. Other physical defects and conditions result in even more serious defects in the reflexes of car operators; yet most of us accept the other driver as being perfectly normal and we take hair-line chances based upon that presumption. The results are carved in stone — gravestone.

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1940 ON WHEELS

(*Continued from page 119*)

The lowest-priced of these models is the Special Six — which is designed to offer a larger and longer car to the man who wants to stay down to the minimum in price. The second in price of these is the De Luxe Six, which has the distinction of being one of the largest sixes on the market. Third is the Pontiac De Luxe Eight, presented to the buyer who wishes the performance of an eight. Finally we mention the utterly new, largest, and most expensive Pontiac — the Torpedo Eight which was conceived to meet the demand for a medium-priced luxury car.

All Pontiacs for 1940 continue the Silver Streak styling. Similarly, all models are equipped with the Pontiac-pioneered Duplex Rear Spring and adjustable Safety-Shift, which is further improved this year. Featured also are: larger windshield, seats, and battery, under-seat heaters for back-seat passengers, larger trunk space, and dual carburation in Torpedo Eight.

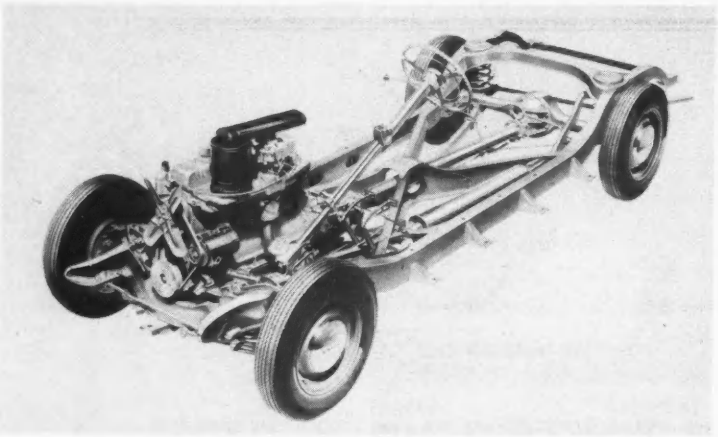
OLDSMOBILE

Oldsmobile presents three series of cars for 1940 — the Sixty, Seventy, and Custom "8" Cruiser. The latter is similar to, but larger than, the Pontiac Torpedo Eight, and comparable to similar La Salle, Buick, and Cadillac models.

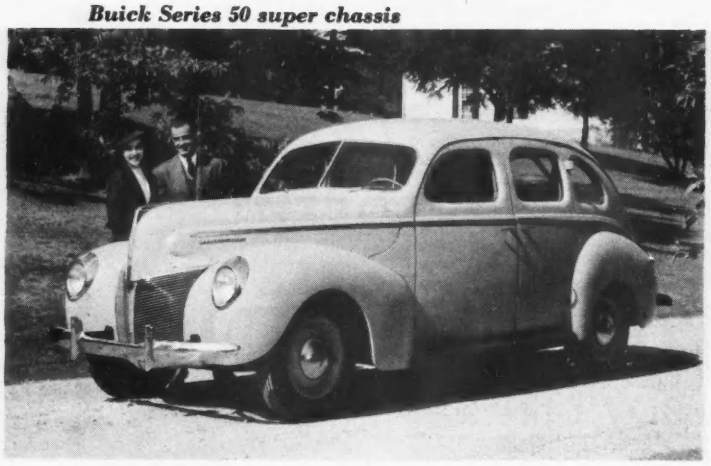
Oldsmobile provides in all models its quadri-coil springing, with improved coil springs on all four wheels. To supplement this type of springing and to give a smoother ride, improved double-acting shock absorbers are coördinated with the coil springs with regard to deflection rate and "give."

Pontiac De Luxe Eight four-door sedan, 100 horsepower

Oldsmobile Custom Eight four-door sedan

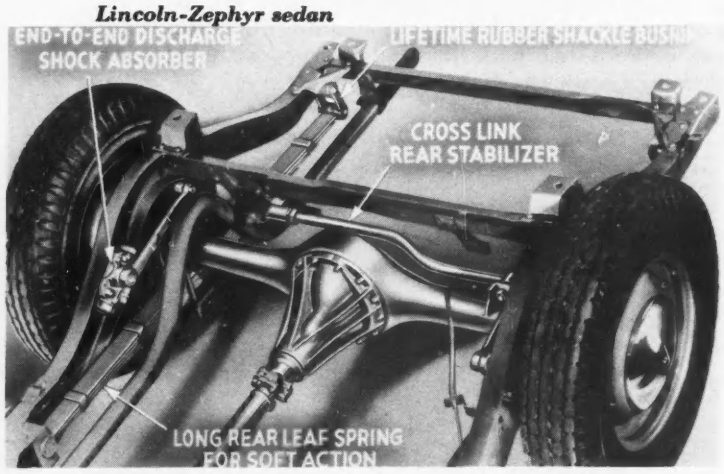


Buick Series 50 super chassis



Mercury Eight town sedan

Lincoln-Zephyr sedan



Cadillac and La Salle rear assembly

BUICK

A "micropoised," dynaflash, valve-in-head, straight eight engine constitutes the 1940 Buick's power plant. A micropoised engine is one electrically balanced after assembly for smoother performance. Turbulator anolite pistons are employed for lower oil consumption and longer life. "Catwalk cooling" is combined with a high-pressure, ultra-rapid circulation to keep engine temperatures down. Under this new system, the fluid is completely circulated every two seconds. Buicoil springing for a "Full-Floating" ride is provided to give a smoother ride and to free the owner of lubrication care. This recoil-wheel mounting is designed to "bank" on turns, thus increasing the car's stability.

Another advancement is the double-wall turret top, to provide an even greater measure of safety.

FORD

There are twenty-two new features on the 1940 Ford, including Finger-Tip Gearshift and Controlled Ventilation. An advertised feature is a new torsional bar ride-stabilizer on all 85 H.P. models with a more flexible transverse spring and an improved shock absorber.

LINCOLN-ZEPHYR

No major mechanical advancement has been made by Ford in the 1940 Lincoln-Zephyr. The principal refinements have come about due to improved styling rather than mechanized improvement. The 1940 Zephyr is a bigger car, where one may find more head, shoulder, and elbow room. Fenders blend more smoothly into the body, and doors, hood, and rear deck are redesigned this year.

The Fingertip Gearshift is standard on all models, as is the Controlled Ventilation.

LA SALLE-CADILLAC

La Salle presents two new cars for 1940: the Fifty series in five body styles and the completely new Special series in two. Cadillac's series Sixty-Two is designed to be the lowest-priced Cadillac for 1940.

Among the mechanical features are: directional turn indicators, automatic spark advance, a vacuum metering system, and a new generator which reaches its peak as low as twenty-seven miles per hour. Accelerator pumps have been redesigned for 1940. A sliding roof has been made available for those who desire the advantages of extra light and ventilation.

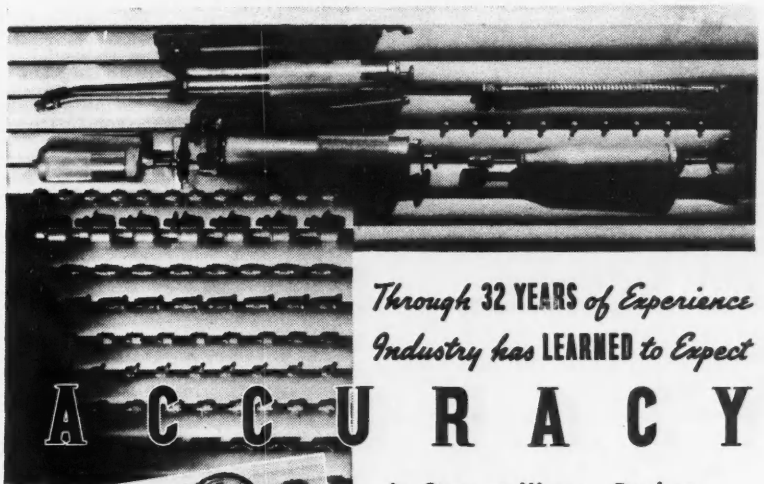
PLYMOUTH

Plymouth designers have produced a car with smooth rear curves. The wheelbase has been lengthened from 112 to 117 inches, making the Plymouth longer in wheelbase than any other low-priced car. The engine's vital parts are superfinished by a patented Chrysler process for smoother operation and longer life. Although the wheelbase is lengthened, the overall length of the car remains the same. Thus, the passengers in the rear seat ride between axles, instead of directly over one. Another body improvement is presented by the rear doors of sedan models; these are full-width and straight-sided instead of being cut out around the wheel housing. The new style doors permit the lowering of rear windows to the sills, thus providing maximum ventilation.

DODGE

The most outstanding achievement in the new series of Dodge "Luxury Liners" is described as a new performance element called the "Full Floating" ride. The

(*Continued on page 131*)



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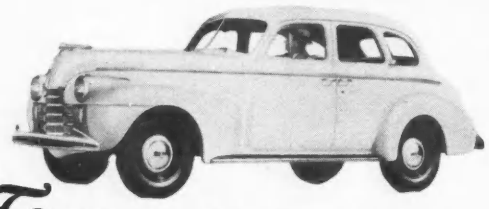

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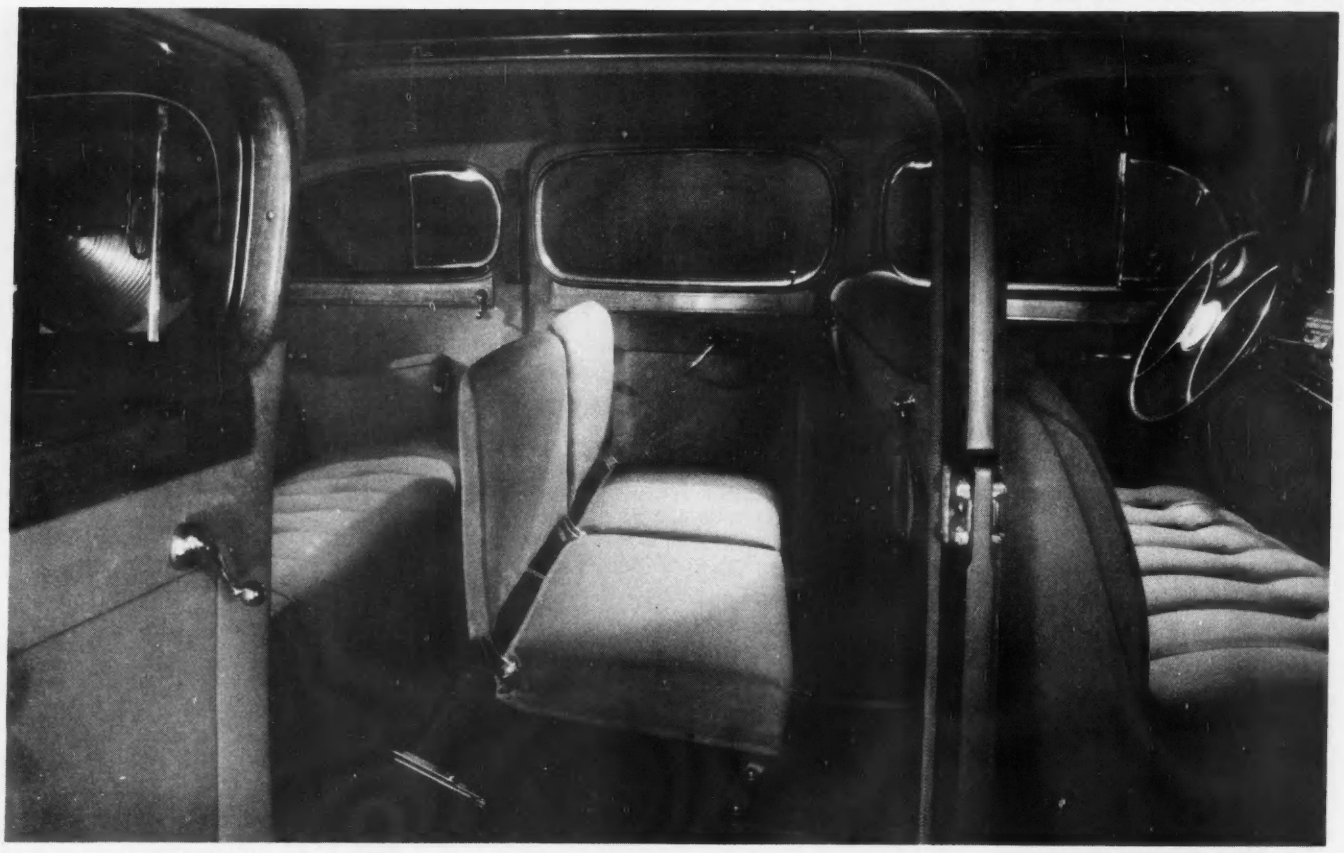
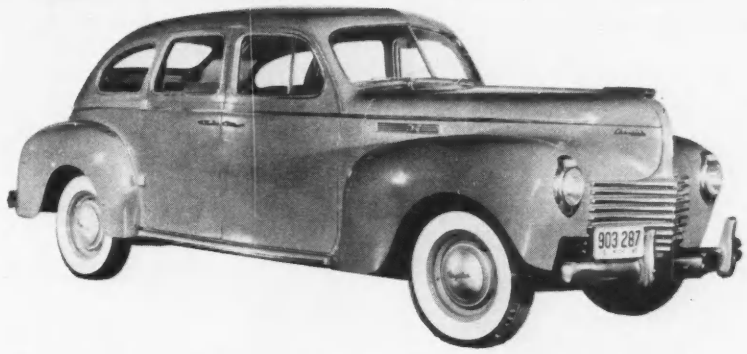
Made of extra quality cotton yarn, carefully inspected, and guaranteed free from all imperfections of braid or finish.
The colored spots are our trade-mark, used only with this quality.
We make braided cord of all sizes, kinds, and colors for all purposes, including sash cord, clothes lines, trolley cord, signal cord, arc lamp cord, and many special cords for special purposes; also cotton twines.

CATALOGUE AND SAMPLES GLADLY SENT ON REQUEST

SAMSON CORDAGE WORKS **89 Broad Street, Boston 9, Mass.**



The roomy interior of the 160 Packard



THIS BEAUTIFUL 1940 CHRYSLER CAR
IN ADDITION TO MANY OTHER
1940 CHRYSLER AND PLYMOUTH MODELS
MAY BE SEEN AT THE
NEAR-BY SALESROOMS OF THE

C. E. FAY COMPANY

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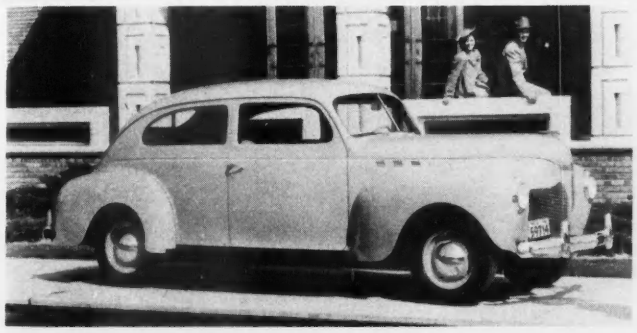
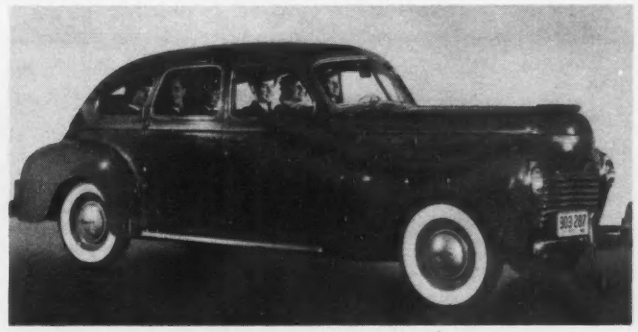
ASPINWALL 4500



The De Soto two-door De Luxe sedan, 100 horsepower



Chrysler's Royal six passenger sedan, 108 horsepower

1940 ON WHEELS

(*Continued from page 129*)

basic principle underlying this ride of the 1940 Dodge is said to consist of a newly perfected system of weight distribution by which the company's engineers have created a scientifically suspended "zone of comfort," the practical advantages of which are further realized through an unusual body layout.

Notable among the many advances distinguishing the new Dodge are: a longer wheelbase; a lower, stiffer, chassis frame with large front cross-members; improved individual-action front springing, combined with four airplane-type shock absorbers; improved steering post gear-shifting mechanism; rubber insulated steering gear mounting; direct steering with individual tie-rods to each wheel; and a further improved all-steel safety body construction presenting many new features.

DE SOTO

De Soto, for 1940, is larger in size and in horsepower. Brilliant new performance is reported with the De Soto 100 horsepower motor. Seats are wider; head and leg room is increased. Rear doors are full width at the bottom. Front door hinges are concealed. The whole chassis is built closer to the ground, and running boards are optional. Greater vision is obtained by increased area in all windows. Reduced glare is the result of a curved rear window. Warning signals on all gauges are provided. A new door insulation has been added to eliminate the entrance of draft and dirt.

CHRYSLER

Completely redesigned and restyled, the 1940 Chrysler line represents an outstanding achievement in beauty. It is, in fact, an entirely new car, with style definitely the motif in all its advertising and sales promotion efforts.

Chrysler's "Cruise and Climb" transmission is offered as extra equipment in all models except the

(*Continued on page 133*)

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Superior
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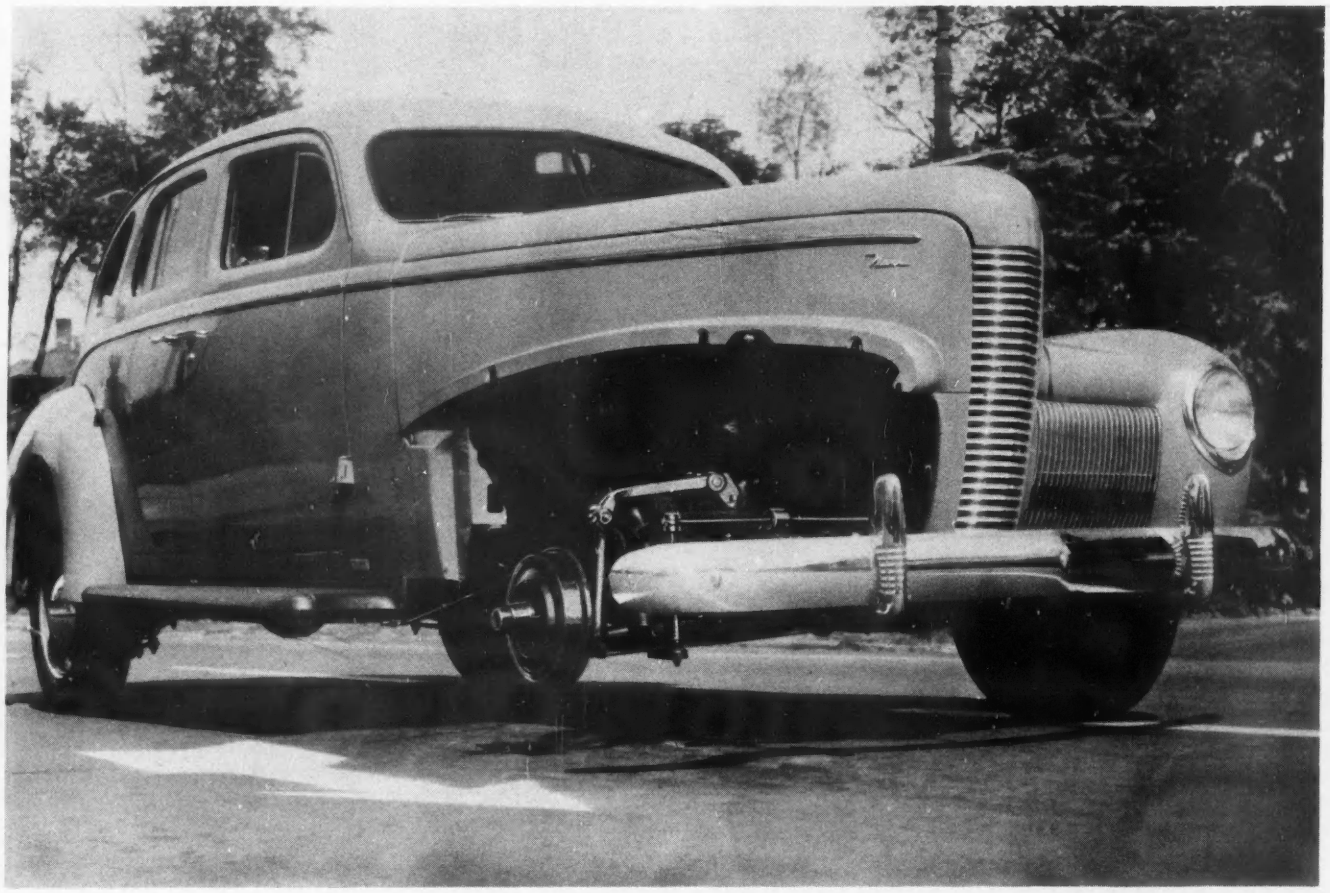


This new Nash, with one of the independently sprung front wheels removed, was driven through normal Detroit traffic as an illustration of the company's new spring arrangement

Toughest..

most abrasion resistant rubber compound known for covering wires and cables is . .

Simplex-TIREX

Selenium Rubber Armor

SIMPLEX WIRE & CABLE Co

79 Sidney St., Cambridge, Mass.

1940 ON WHEELS

(*Continued from page 131*)

Crown Imperial, in which it is standard. The famous Fluid Drive, introduced with such marked success last year in the Custom Imperial and Imperial models is offered as extra equipment, but is standard in the Crown Imperial. In all cases, where Fluid Drive is used, overdrive is essential.

PACKARD

With its four-year program of factory redesigning finally completed, Packard offers for 1940 what it considers to be its greatest value.

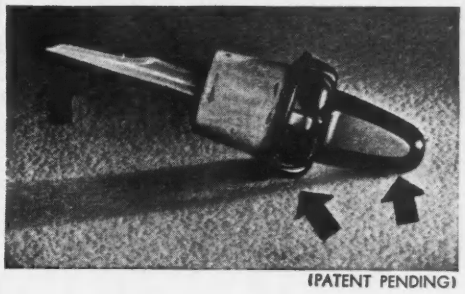
The company's prime advancement of the year is in the form of an improved Safe-T-Flex suspension, the finest wheel springing ever to grace the axles of a Packard. As an integral part of this suspension system, a new steering mechanism less subject to recoil from road shock has been added, resulting in greater ease of handling.

NASH

Clean, trim designing is the keynote of the 1940 Nash. Styled by George Walker, noted industrial designer, the car presents a striking, high-crowned front ensemble. The Nash transmission for 1940 includes a fourth forward speed for economy, and a new Automatic Overtake gear for an instantaneous spurt of power.

Nash's ventilating system is carried out principally by means of the Weather Eye, an air-conditioning device which cleans and filters as well as warms the air in the winter, and keeps the air pressure in the car slightly greater than the pressure outside. The back seat is easily convertible to a full-length double-size bed.

(*Continued on page 134*)



(PATENT PENDING)

HIGGINS brings you a new **stopper** for your greater convenience

This improved quill stopper has been adopted for the famous Higgins Drawing Ink desk bottle to add to its convenience and safety. Its several new features are as follows:

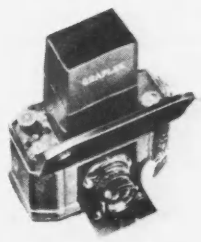
1 Shoulder ridges make stopper easy to grip for turning to remove from bottle neck and prevent rolling when stopper is placed on a sloping drawing table.
2 Stopper is weighted so it always rests with point of quill up.
3 Flat side on steeple provides a thumb rest which is so arranged that open face of quill is always uppermost when thumb is placed upon it, thus guarding against spilling.
4 Quills are genuine feather quills which will not splinter or break and are just right to take up enough ink for one filling of ruling pen.
5 Large cork makes possible bottle neck wide enough to admit freely lettering pen or brush.

New stoppers and empty bottles may be purchased from your College Store or Stationer

HIGGINS

CHAS. M. HIGGINS & CO., INC. • 271 NINTH STREET • BROOKLYN, N. Y.

ROLLEIFLEX



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IN BUSINESS OVER 25 YEARS
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Back of Fenway Park
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TECHNOLOGICAL LAGGARDS

(*Continued from page 117*)

mittee, points out: "There are psychological factors in individual and group behavior which predispose toward inertia in receptivity to (technological) innovation, but these may be counterbalanced by potent incentives that promise material and nonmaterial rewards."

In the automotive field, we have fertile ground in which to work. Motorists today are thoroughly disgusted with the conditions of congestion, lack of parking facilities, dangerous roads, and other factors preventing maximum use and enjoyment of their vehicles. By stressing the advantages that will accrue when these problems, difficult though they may be, are solved, we can hasten the time when the public at large can enjoy the full benefits made possible by the engineers and technicians.

Lane Body Co.
AUTOMOBILE REPAIRS
Specializing in front end alignment
16 Portland Street **Cambridge**

1940 ON WHEELS

(*Continued from page 133*)

HUDSON

Three new lines of 1940 Hudsons, awarded eighty-four new American Automobile Association records for performance and endurance, have been presented.

In the new Hudson Six, new features, new fabrics, and a new style of upholstery make their appearance, in addition to independent front wheel coil springs.

Also spotlighted for 1940 is the Hudson Eight and its companion car, the Hudson Super-Six, differing only in power plant.

Several new mechanical advances have been made by Hudson this year, among which are: a new overdrive transmission, a lateral stabilizer to prevent sidesway due to a strong wind or curves, directional signal lights for turning, Weather-Master heat control, a new, heavier, X-type frame, and a 17 per cent deeper windshield.

STUDEBAKER

The new Studebakers are produced in three groups, the Champion, the Commander, and the President series.

Safety features include better visibility than in recent years. Styling, which has again been directed by Raymond Lowry, makes use of chromium stainless steel, colorful plastics, and broadcloth upholstery to create a "living room" atmosphere.

GRAHAM

The 1940 Graham line comprises two 93 horsepower and two 120 horsepower supercharged models, each of which is furnished in three body types.

Everywhere the crowds agree ✓

"FOR IMPORTANT IMPROVEMENTS SEE THE NEW FORDS FIRST!"

IN A 1940 FORD *you get more room, greater quiet, a finer ride, easier handling, and a much more luxurious car than ever before. There are no less than 22 important 1940 improvements, including:*

- Greater legroom, elbowroom; new seating comfort
- New finger-tip gearshift on steering column (All models, no extra cost)
- Improved soundproofing; quieter operation
- Stunning new interior richness throughout
- Self-sealing hydraulic shock absorbers
- New front window ventilation control
- New instrument panels; new 2-spoke wheel
- Improved springing and chassis stabilizing on all 85 h.p. models
- New Sealed-Beam headlamps; beam indicator on dash

and the only V-8 engine in any low-priced car!

FORD V-8

DE LUXE FORD V-8

WITH the only V-8 engines in the low-price field . . . with big hydraulic brakes and a fine-car ride on 123-inch springbase . . . *and with 22 new improvements* that make them more than ever like the high-priced cars in look and feel and ride . . . the cars to see first if you want *most* for your money are the new Fords at your dealer's now. See them today!

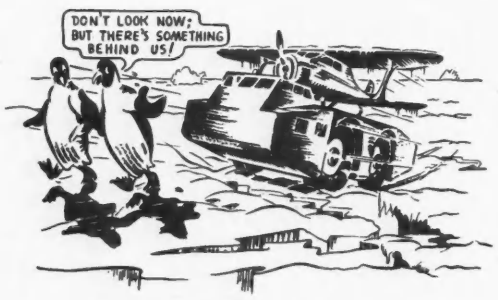
G-E Campus News

20,000,000TH OFFSPRING

LAST month, the historic city of Lynn, Massachusetts, paraded, unveiled a tablet, and had a ceremony in its new stadium—all because of the 50th anniversary of one of its most prominent families. But commendable as a Golden Anniversary may be, that was only part of the reason. The city was also hailing the arrival of the family's 20,000,000th offspring.

"Watthour meters" is the family name, and it was in 1889 that Professor Elihu Thomson, electrical genius, developed the first practicable meter of this type. Produced by the Thomson-Houston Electric Company, one of the organizations which were merged in 1892 to form the General Electric Company, this early meter stepped into a world having only 17,500 household users of electricity. The 20,000,000th meter joined a world which in 1938 had 22,900,000 household users.

The G-E factories at Lynn today are a far cry from the small factory of 50 years ago which produced little dynamos and arc lamps—two great factories now produce powerful motors, ship-propulsion equipment, turbines, superchargers for airplanes. At Lynn, too, there is a division of General Electric's Test Course for recent graduates of engineering colleges.



SNOW CRUISER

WHEN it comes to dignity, Antarctica's penguins, with their permanent tail coats and stiff shirts, are right in the front row. But their dignity is due for a shock. A "snow cruiser" will soon be rolling across the penguins' icy front yard. Putting it mildly, this cruiser is quite different from the locomotives, trolley coaches, and other vehicles that G-E engineers help to build or equip. But these engineers weren't the least perturbed when called upon to design electric equipment for the strange conveyance. Four G-E traction motors, generators for the two 150-hp diesel engines, and complete control equipment were installed.

The cruiser was designed by the staff of the Research Foundation of the Armour Institute of Technology for use by the Government during the U. S. Antarctic Service under Rear Admiral Byrd. It is so built that it will crawl over crevasses 15 feet wide. Constructed by the Pullman-Standard Car Mfg. Co., the vehicle is 55 feet long and will weigh 75,000 pounds when fully loaded. Ten-foot pneumatic tires support the four wheels. A five-passenger airplane is carried on top.

OPPORTUNITY

IN five universities, eight selected college graduates are doing research work in electricity, physics, and chemistry, aided by Charles A. Coffin Foundation Fellowships. As undergraduates these men attended the U. of Cincinnati, Johns Hopkins, College of the City of New York, U. of Washington, Oberlin, Columbia, Muhlenberg, and Denison.

These awards are granted annually by General Electric in honor of the Company's founder and first president—Charles A. Coffin. Several previous recipients have attained national, and even international, fame; one, Dr. Carl D. Anderson, has received the Nobel Award in Physics—probably the outstanding recognition for scientific achievement.

The committee of three distinguished men who will make next year's awards is composed of: J. H. VanVleck, representing the National Academy of Sciences; Olin J. Ferguson, representing the Society for the Promotion of Engineering Education; and F. Malcolm Farmer, representing the American Institute of Electrical Engineers. Applications for the 1940 fellowships are now being distributed to colleges and universities. They must be completed and returned to the Secretary of the Charles A. Coffin Foundation, Schenectady, N. Y., before January 15, 1940.

GENERAL ELECTRIC

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